Natural Oil Seeps in Southern California

Crude oil and natural gas naturally enter the ocean at areas known as “seeps.” The offshore seeps along the Southern California coast are particularly visible, abundant, and well-studied.

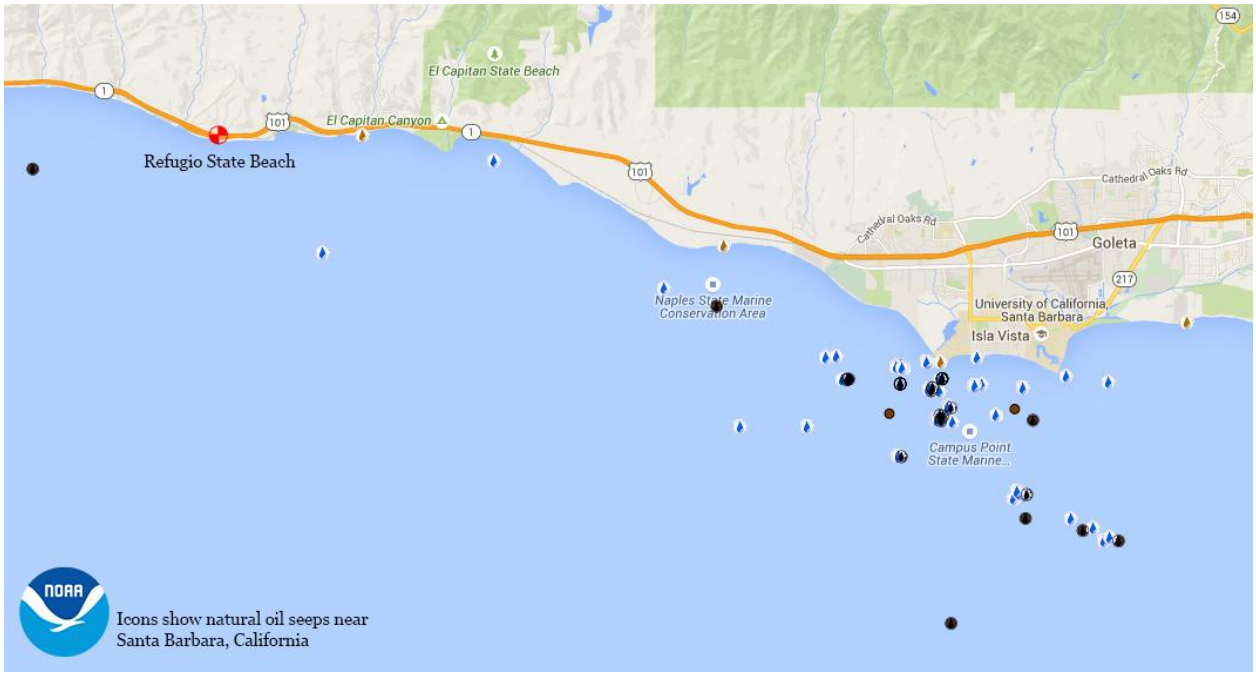
- Offshore seeps in Southern California add about 5 million gallons of oil to the ocean annually, with wide year-to-year variation (National Academy of Sciences, 2003).
- Though from a natural source, oil from seeps shows similar appearance, behavior, and effects as oil released during drilling and other human activities.
- Oil from seeps affects fish, birds, and wildlife; can impair surface waters and shorelines; and can impact recreational activities.

What are seeps?

Seeps are areas where oil and natural gas naturally leak out of the ground through fractures and sediments, in the same way freshwater springs bring water to the surface.

How common are they in California?

The waters off Southern California host hundreds of known, naturally occurring oil and gas seeps, with more documented on land. Although their rate of release may vary over time, their locations are consistent and predictable. Slicks from many larger seeps are visible by satellite, and some are persistent enough to be features on navigation charts.



How much do seeps leak?

Natural seeps in Southern California contribute about 5 million gallons of oil to the ocean annually, with wide year to year variation (NAS 2003). However, in the Coal Oil Point area alone, seep estimates range from 4,200 to 25,000 gallons of oil per day, or 1.5 to 9 million gallons annually (Leifer et al. 2005),

indicating substantial uncertainty in these numbers. These seeps likely have been leaking for thousands of years.

What does oil from natural seeps look like?

Seep oil can vary in appearance and surface extent, depending on weather and sea conditions and flow rates. The oil from some seeps is sticky and thick, like tar; in others, it is dark and fluid, like used motor oil.

How does seep oil behave?

Oil from underwater seeps generally behaves like oil spilled during or after extraction, forming large slicks which spread and drift with winds and currents. The slicks can form miles-long lines of black, brown, and tan oil, easily observed from the air.

As the oil drifts away from the seeps in Southern California and continues to weather, it forms tarballs and mats. These may come ashore or be carried more than 100 miles up or down the California coast, as far south as San Diego and north as Point Reyes near San Francisco.

How can seep oil be distinguished from spilled oil?

Natural oil seeps off of Santa Barbara are a confounding factor when determining the source of oil observed offshore during the spill response at Refugio State Beach. In this region, oils from platforms even in close proximity can vary significantly in their composition and properties. The spill at Refugio State Beach consisted of an undefined blend of crude oils coming from multiple near-shore platforms. Some of the floating and stranded oil from the ruptured pipeline is now co-mingled with oil originating from ocean seeps.

Natural seeps stem from oil fields underneath the seafloor. Oils extracted from these formations may be chemically similar, but oil coming from seeps is often more degraded and weathered than spilled oil. One way to identify seep oil is by the consistent pattern of surface expression, which can be traced back to the source from the air. Slicks of seep oil may also be associated with bubbling of natural gas at the ocean surface.

It is difficult to visually distinguish older seep oil floating on the surface and stranded on the shore from spilled oil. While there are ways to qualitatively and quantitatively differentiate natural seep oil from the pipeline oil, it is not an easy or straightforward effort. Chemists supporting the response are discussing how to determine this answer, as it will impact the amount of cleanup and restoration for which the responsible party is ultimately liable.

What are the impacts of seep oil?

Oil from seeps has been found to be toxic to fish, sea stars, and shrimp, with the toxic effects largely limited to the immediate seep area. According to a 2014 study by Henkel et al., more than 1,000 birds each year are oiled in Southern and Central California, primarily due to natural seeps. The greatest number of oiled birds was found in Santa Barbara County. Tarballs from seeps washing up on Southern California beaches have long been a nuisance to beachgoers, while boaters moving through slicks from natural seeps may detect noxious odors.

For more information about NOAA's Office of Response and Restoration, visit response.restoration.noaa.gov or call (301) 713-2989.